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10/566,723	02/02/2006	Tatsuya Igarashi	1982-0258PUS1	9724

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EXAMINER
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HOLLWEG, THOMAS A

ART UNIT	PAPER NUMBER
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2879

NOTIFICATION DATE	DELIVERY MODE
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08/12/2009

ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

mailroom@bskb.com

<b>Office Action Summary</b>	<b>Application No.</b> 10/566,723	<b>Applicant(s)</b> IGARASHI ET AL.	
	<b>Examiner</b> Thomas A. Hollweg	<b>Art Unit</b> 2879	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 29 July 2009.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-5 and 7-15 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-5 and 7-15 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>7/29/09</u> .   | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Acknowledgment of Amendment***

1. Applicant's Amendment of April 23, 2009, is acknowledged. Claim 6 is canceled. Claims 1-5 and 7-15 are currently pending.

### ***Information Disclosure Statement***

2. The information disclosure statement (IDS) submitted on July 29, 2009, is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

### ***Specification***

3. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required: claim 1 claims an external quantum efficiency of up to 100%, while over 15.8% is not disclosed.

### ***Claim Objections***

4. The following claims are objected to because of the following informalities:
  - a. Claim 1, the word "grop" in the phrase "sulfonylamino grop," is misspelled.
  - b. Claim 13, "the hole-transporting layer" and "the electron-transporting layer" lack antecedent basis.
  - c. Claim 14, "the hole-transporting layer" and "the electron-transporting layer" lack antecedent basis.Appropriate correction is required.

***Claim Rejections - 35 USC § 112, First Paragraph***

5. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

6. Claims 1-5 and 7-15 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

7. Claim 1 includes the provision that “R<sup>104</sup> and R<sup>109</sup> do not represent a bromine atom.” This provision is not included in the original disclosure and is new matter. The specification, pages 10-14, specifically allow that R<sup>104</sup> and R<sup>109</sup> may represent a bromine atom (page 13, line 25). It is noted that page 15, lines 2-5, only suggests preferred atoms for R<sup>104</sup> and R<sup>109</sup> and does not require the inclusion or exclusion of previously listed atoms.

8. Claims 1-5 and 7-15 are rejected under 35 U.S.C. 112, first paragraph. Claim 1 contains the limit that the “external quantum efficiency of the device is 6% or more.” This limitation covers any external quantum efficiency above 6% including 100%. While the specification is enabling for 6% to 15.8% (example 1), it does not reasonably provide enablement for 15.9% to 100%. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to build the invention commensurate in scope with these claims.

***Claim Rejections - 35 USC § 103***

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

**10. Claims 1-5 and 7-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sato et al., U.S. Patent Application Publication No. 2003/0218418 A9, in view of itself.**

11. **With regard to claim 1**, in figure 2, Sato discloses an organic electroluminescent device having at least one organic layer (4-7) containing a light-emitting layer (5) between a pair of electrodes (2, 8), wherein the light-emitting layer contains at least one host material (H-1), wherein the organic electroluminescent device contains a compound (Dye-1) emitting fluorescence at a time that voltage is applied, and a light emission at the time that voltage is applied is mainly derived from a light emission from the fluorescent compound [0248], wherein the compound emitting fluorescence is represented by one of the formulae (1)-(5) [0238-0249].

12. However, Sato is silent as to the external quantum efficiency of the device.

13. Sato teaches that the light efficiency of the fluorescent material may be close to the efficiency of phosphorescent material [0035, 0262], which as Applicant has acknowledged, has been shown to have an external quantum efficiency of 8% (specification, page 2).

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14. Because one having ordinary skill in the art would understand that a higher external quantum efficiency is desired, based on Sato teaching, at the time of invention, it would be obvious to one having ordinary skill in the art to optimize the Sato device to have an external quantum efficiency of 6% or more.

15. **With regard to claim 2**, Sato is silent as to the internal quantum efficiency of the device.

16. However, for the same reasons stated in the rejection of claim 1 above, at the time of invention, it would have been obvious for a person having ordinary skill in the art to optimize the Akiyama device where the internal quantum efficiency is 30% or more.

17. **With regard to claim 3**, in figure 2, Akiyama discloses that the organic electroluminescent device contains an amplifying agent (T-2) performing a function of amplifying a number of singlet excitons generated at the time that voltage is applied, thus amplifying an intensity of the light emission [0035].

18. **With regard to claim 4**, in figure 2, Sato discloses that a maximum light-emitting wavelength from the compound emitting fluorescence is 580 nm or less [0248].

19. **With regard to claim 5**, in figure 2, Sato discloses that the host material is a complex [0241].

20. **With regard to claim 7**, in figure 2, Sato discloses that the organic electroluminescent device has an electron-transporting layer (7), and the electron-transporting layer (5) contains a non-complex compound [0240].

21. **With regard to claim 8**, in figure 2, Sato discloses that the amplifying agent is a transition metal complex [0052-0129].

22. **With regard to claim 9**, in figure 2, Sato discloses that a concentration of the amplifying agent contained in the light-emitting layer is 9 weight % or less [0242].

23. **With regard to claim 10**, in figure 1, Akiyama discloses that a difference between the maximum light-emitting wavelength of the compound emitting fluorescence (Dye-1) at the time that voltage is applied, and a maximum light-emitting wavelength of the amplifying agent (T-2), is 70 nm or less [0248] (maximum light-emitting wavelength of the amplifying agent is inherent to the material used).

24. **With regard to claim 11**, in figure 2, Sato discloses that a difference between the maximum light-emitting wavelength of the amplifying agent (T-2), and an absorption maximum wavelength of the compound emitting fluorescence (Dye-1) at the time that voltage is applied, is -20 nm or more (values inherent to the materials used) [0241-0242].

25. **With regard to claim 12**, in figure 1, Akiyama discloses that the organic electroluminescent device has a hole-transporting layer (4), the light-emitting layer (5) and the electron-transporting layer (7), and a light emission from the compound emitting fluorescence is 80% or more of a total light emission obtained from the organic electroluminescent device [0239-0248].

26. **Claims 13 and 14 are is rejected under 35 U.S.C. 103(a) as being unpatentable over Sato, as applied to claims 1 and 3 above, in view of Akiyama, U.S. Patent Application Publication No. 2002/0146589 A1.**

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27. **With regard to claim 13**, in figure 2, Sato discloses that the organic electroluminescent device has a hole-transporting layer (4), the light-emitting layer (5) and an electron-transporting layer (5) [0239-0248].

28. Sato does not expressly disclose that the device has neither a hole blocking layer nor an exciton blocking layer between the light-emitting layer and the electron-transporting layer.

29. Akiyama, in figure 1, discloses an organic electroluminescent device that has neither a hole blocking layer nor an exciton blocking layer between the light-emitting layer (4) and the electron-transporting layer (5) [0031].

30. At the time of invention, it would have been obvious for a person having ordinary skill in the art to construct the Sato device where the device has neither a hole blocking layer nor an exciton blocking layer between the light-emitting layer and the electron-transporting layer, as taught by Akiyama, because this would reduce manufacturing steps.

31. **With regard to claim 14**, in figure 2, Sato discloses that the organic electroluminescent device has the hole-transporting layer (4), the light-emitting layer (5) and the electron-transporting layer (7) [0239-0248].

32. Sato does not expressly disclose that the light-emitting layer has at least one alternately laminated structure including a layer containing at least one compound emitting fluorescence at a time that voltage is applied and a layer containing at least one amplifying agent.



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33. Akiyama, in figure 1, discloses an organic electroluminescent device where the light-emitting layer (4) has at least one alternately laminated structure including a layer containing at least one compound emitting fluorescence at a time that voltage is applied and a layer containing at least one amplifying agent [0040].

34. At the time of invention, it would have been obvious for a person having ordinary skill in the art to construct the Sato device where the light-emitting layer has at least one alternately laminated structure including a layer containing at least one compound emitting fluorescence at a time that voltage is applied and a layer containing at least one amplifying agent, as taught by Akiyama, to improve luminescent efficiency.

**35. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sato and Akiyama, as applied to claim 14, and further in view of Forrest et al., U.S. Patent No. 6,310,360 B1.**

36. **With regard to claim 15**, Sato and Akiyama disclose all of the limitations of claim 14, including that the light-emitting layer maybe formed in separate layers, where one layer contains a compound emitting fluorescence and another layer containing an amplifying agent.

37. However, neither Sato nor Akiyama expressly discloses that the light-emitting layer has an alternately laminated structure of ten or more layers.

38. Forrest teaches an electroluminescent device with a light-emitting layer having multiple layers, one layer containing a compound emitting fluorescence and another layer containing an amplifying agent, that are arranged in an alternately laminated structure of ten or more layers (col. 13, lines 22-26).

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39. At the time of invention, it would have been obvious for a person having ordinary skill in the art to construct the Sato and Akiyama device where the light-emitting layer is arranged in an alternately laminated structure of ten or more layers, as taught by Forrest, because this arrangement encourages more intersystem crossing, leading to more efficient fluorescent emission.

### ***Response to Arguments***

40. Applicant's arguments have been fully considered but are moot in light of the new grounds for rejection.

### ***Conclusion***

41. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

42. A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

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43. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thomas A. Hollweg whose telephone number is (571) 270-1739. The examiner can normally be reached on Monday through Friday 7:30am-5:00pm E.S.T..

44. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimesh Patel can be reached on (571) 272-2457. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

45. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/TH/

/Peter J Macchiarolo/  
Primary Examiner, Art Unit 2879